

UK Inertial Fusion Science & AWE Links

October 2009

Content

- Background
- Meeting Objectives
- Brief AWE Overview

Background

The UK IFE Community is very small

Resources in Academia and Defence are limited

The achievement of ignition is possible in the next couple of years (NIF)

Other facilities are becoming available (eg ORION)

- AWE commenced an experimental study of ICF capsule implosions, underground, 30 years ago. It was successful and validated codes in a relevant regime.
- Two relevant reviews are imminent – the UK Fusion Energy Strategy & the STFC Investment strategy

The interaction between the defence and academic communities is not as strong as in the US and France

It makes sense to explore the potential for increased interaction within the UK

Meeting Objectives

- Provide a technical overview of relevant activities
- Consider the implication of current reviews
- Explore the potential for increased interaction within the UK
- Discuss next steps, including European interaction (HiPER) and US (NIF) and the role that the Centre for Inertial Fusion Science (CIFS) can play

AWE Operating Division

Robin McGill
Chief Executive

	David Filbee	Graeme Nicholson	Richard Tinsley	Andrew Jupp	Bob Irvin	Rob Fletcher	David Maitland	Andy Kershaw
Executive	Director, Systems Engineering	Director, Science and Technology	Director, Trident	Director, Infrastructure Programme	Director, Major Projects	Director, Commercial	Director, Safety and Corporate Services	Director, Finance
Programme	Successor	Capability	Trident	Infrastructure				
Functional Responsibility	Chief Engineer War Head - Engineering Projects Delivery	Chief - Scientist Physics Materials Threat - Reduction Projects - Delivery	Manufacturing Assembly Logistics Product Quality Projects - Delivery	Site Control Site Services Waste Mgt Engineering - Assurance Facility - Engineering Projects Delivery	Major Projects	Commercial Programme Business Devp't Supply Chain	ES&H HR and Change Communications Corporate Audit Security IT Quality	Finance Legal Sanctioning

Peter Roberts
Head of Plasma Physics



Distinguished Specialists
Peter Thompson
John Foster
Brian Thomas

Facility Safety
Graham White
Steve Melton



Tom Bett
Laser Operations
Target Fabrication
ORION sponsor



Tim Goldsack
Plasma Experiments
Diagnostics &
Modelling



Adrian Gannon
Radiation Science
capability
VIPER & ASP



Paul Morris
Engineering Manager
& ORION Installed
Equipment



Areas of study

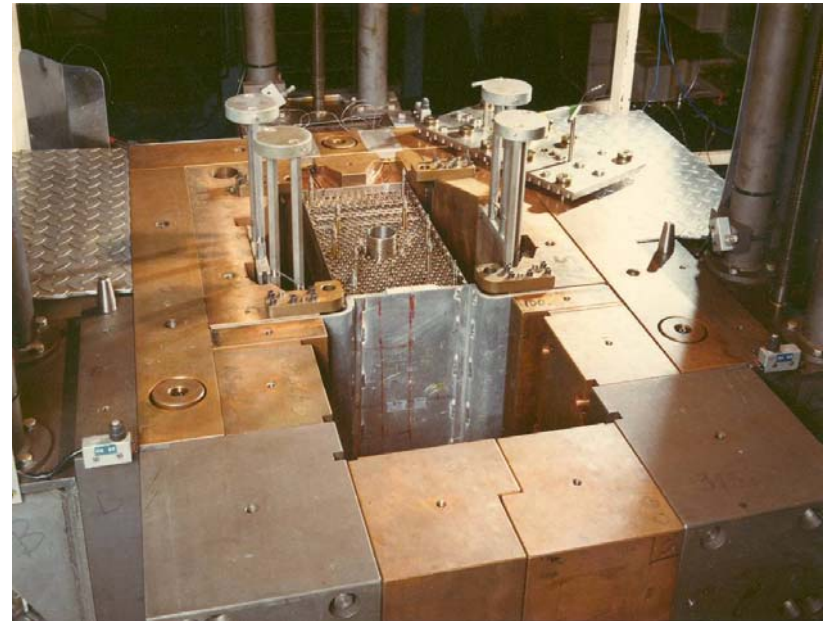
HEDP:

- Radiation transport
- Radiation hydrodynamics
- Material properties – opacity, EoS, strength, spall
- Nuclear physics including fusion/burn
- Plasma dynamics including instabilities
- Integrated effects

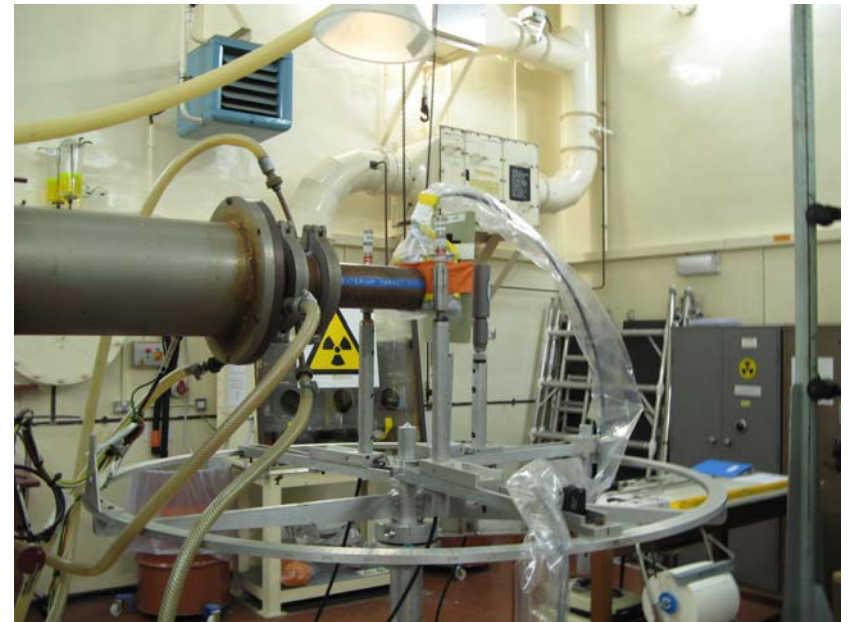
Radiation Science:

- X-ray, Γ -ray and neutron transport and interaction
- Material and system response including neutron effects, thermo-mechanical and electrical / electromagnetic.

VIPER



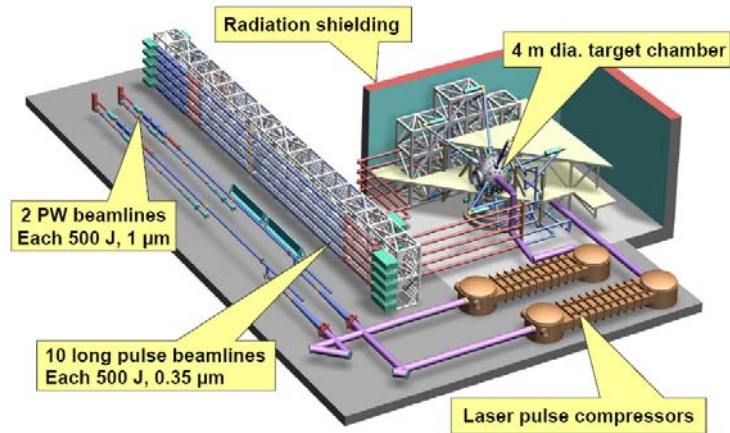
ASP



ORION



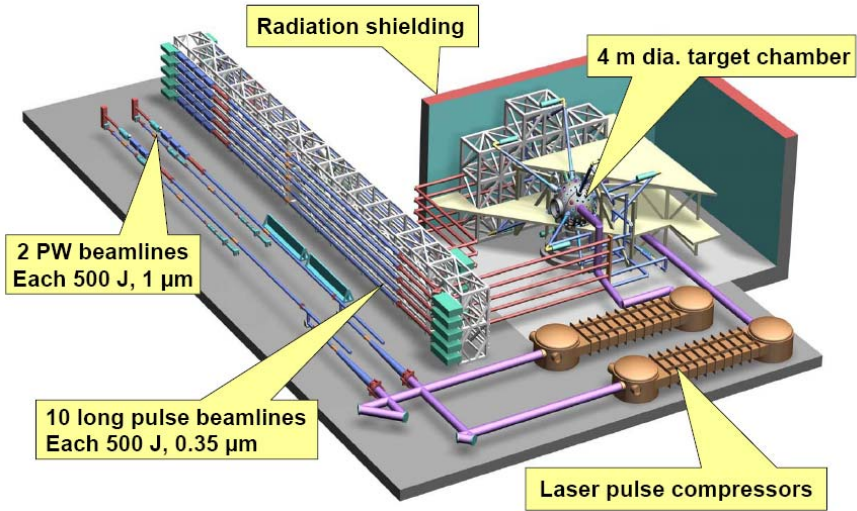
ORION



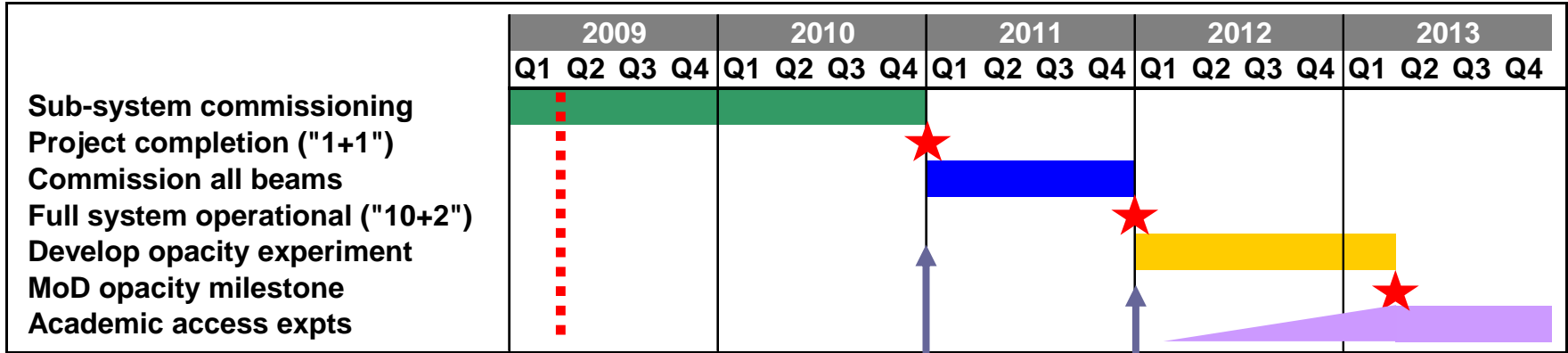
ORION



ORION

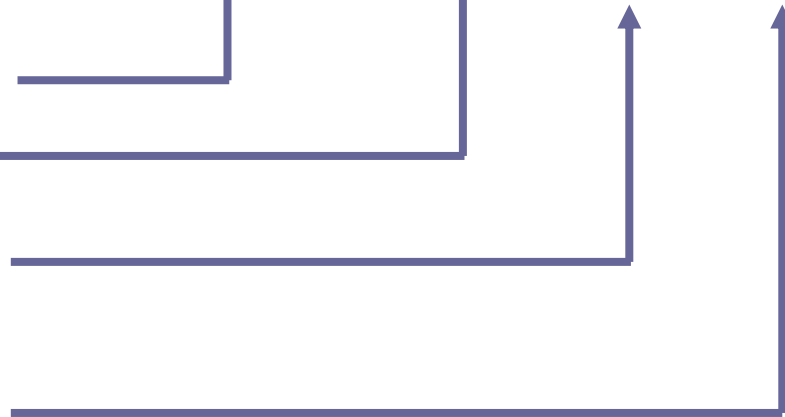


Limited “compatible” academic access may be possible during 2012. More extensive access becomes available thereafter.



Orion academic access timescales

- One short-pulse, one long-pulse beam available
- All beams available
- Opportunity for compatible, “low facility impact” collaborative access to ORION.
- More extensive access to ORION becomes available



National Ignition Facility
LLNL

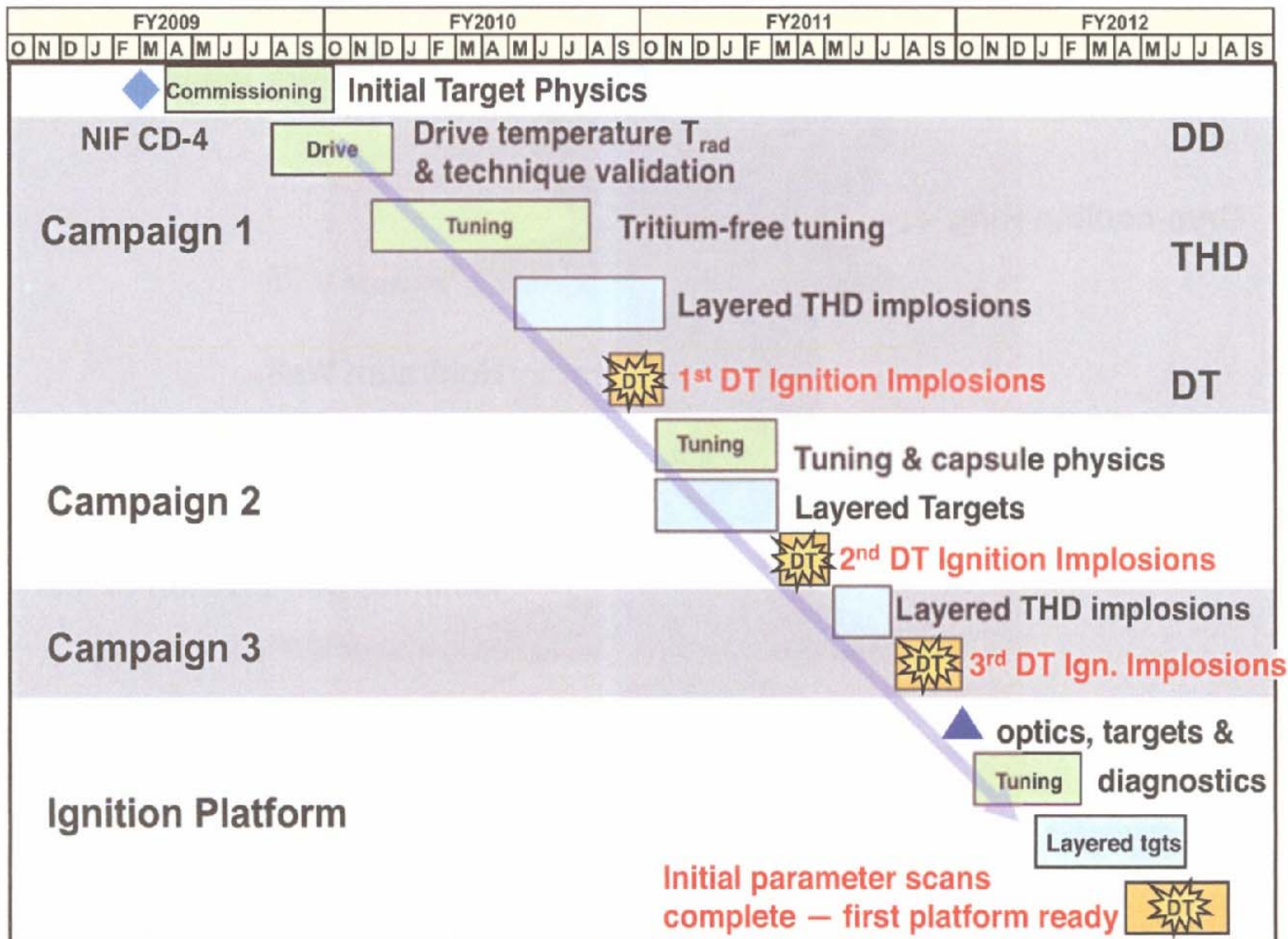
NIF – Dedicated May 2009



NIC EP Rev 3.1— Includes three ignition campaigns and deployment of an initial ignition platform



The National Ignition Campaign



Centre for Inertial Fusion Science

Objectives:

- Provide a means for interacting with the academic community, including HiPER
- Provide a forum for discussing HEDP experiments on ORION
- Established at Imperial College, Oct 1st 2009
- Intended to be inclusive

AWE presentations

- Capsule / Hohlräum Code Development and preliminary calculations of a HiPER design
- Implosion modelling, uses of ignition
- Recent OMEGA implosion data
- Recent HELEN data
- Fast Electron modelling

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